



POPULATION AND SEASONAL STATUS OF MIGRATORY BIRDS OF BORITH LAKE AND SURROUNDING AREAS OF HUNZA

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ABSTRACT

The population and seasonal status of migratory birds of Borith Lake and surrounding areas of Hunza was studied from August 2021 to March 2022. The study area is situated between Passu Gar and Ghulkin Glacier in the district of Hunza, Gilgit Baltistan. A total 161 migratory species belonging to 18 orders and 39 families were recorded during the field investigation. Out of these, 78 species are passage migrants, 21 winter visitors / passage migrants, 50 summer breeding visitors/ passage migrants, and 12 species are winter visitors. While 47 species observed as common, 92 less common, 9 scarce and 13 species were listed as rare. In the Spring from mid-February to mid-March and in the Summer from mid-August to mid-September large number of migratory birds were observed at the lake and surroundings areas. The findings of the present study provide the scientific baseline information about the population and seasonal status of migratory birds at the Borith Lake for further studies and conservation planning.

Keywords: Gilgit Baltistan, avian fauna, winter visitors, summer breeding visitors, birds counting.

INTRODUCTION

Every year, several billions of birds migrate between continents (Berthold, 1973). There is mounting evidence that seasonal interactions influence migratory animals' individual survival (Harrison *et al.*, 2011), but the effects on populations as a whole are still little understood (Gill *et al.*, 2001; Gunnarsson *et al.*, 2005; Reudink *et al.*, 2009). Understanding the relative effects of pressures faced throughout the annual cycle for migrants whose ranges may cross continents can be difficult, especially since several species are frequently intensely evaluated during one season while not much is known about their allocation or actions in the other (Bensch *et al.*, 2006; Salewski and Jones, 2006). Since seasonal connections and their effects on the overall population dynamics among migratory species are less well understood, the effects of changes of climate and environmental conditions during breeding, migration, or non-breeding periods on population abundance are frequently considered in isolation (Marra *et al.*, 1998; Gill *et al.*, 2001; Gunnarson *et al.*, 2005).

Migration is a significant behavior for animals to complete their annual life cycle (Sherry and Holmes, 1996) happens to accommodate seasonal variations, predator protection, food resources, and shelter (Lank *et al.*, 2003). The

abundance of migratory birds in a particular location indicates that the habitat is favorable for nesting, feeding and breeding (Scott, 1991). Regularly, birds often migrate from the Northern Arctic region to the Southern Plains, passing the winter season in tropical areas where they stay for several months before moving to temperate areas where they spend two to three months nesting (Baillie and Peach, 1992).

Pakistan is included in the list of countries that serve as wintering grounds for more than 400 migratory bird species (UNEP, 2014). These birds travel a vast and extraordinary 4500 kilometers each year. In Pakistan, wetlands and 19 Ramsar sites located across the Indus basin help them in their four to five-months trek by providing good habitat, food and home. These birds migrate to Pakistan from September to November through the Indus flyway via Karakorum and Suleiman mountain ranges, where they reach the Indus river and stay there from February to March before returning to their breeding grounds (Sheikh and Kashif, 2006; Umar *et al.*, 2018).

Pakistan being zoogeographically very rich and contains great diversity of flora and fauna (Khan *et al.*, 2023). The biological zones and vegetation ranges of Gilgit Baltistan (GB) support a diverse range of flora and fauna. A total of 17 fish species, 360 bird species, and about 50 animal species exist.

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Table 1. Order Accipitriformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Accipitriformes	Accipitridae	<i>Pernis ptilorhynchus</i>	Oriental Honey-buzzard	C	PM
2	Accipitriformes	Accipitridae	<i>Aegypius monachus</i>	Cinereous Vulture	Ra	PM
3	Accipitriformes	Accipitridae	<i>Gyps fulvus</i>	Griffon Vulture	Ra	PM
4	Accipitriformes	Accipitridae	<i>Aquila clanga</i>	Greater Spotted Eagle	Sc	PM
5	Accipitriformes	Accipitridae	<i>Hieraaetus pennatus</i>	Booted Eagle	C	SBV/ PM
6	Accipitriformes	Accipitridae	<i>Aquila nipalensis</i>	Steppe Eagle	L C	PM
7	Accipitriformes	Accipitridae	<i>Circus aeruginosus</i>	Eurasian Marsh-Harrier	C	PM
8	Accipitriformes	Accipitridae	<i>Circus cyaneus</i>	Northern/Hen Harrier	C	PM/ WV
9	Accipitriformes	Accipitridae	<i>Accipiter badius</i>	Shikra	L C	SBV/ PM
10	Accipitriformes	Accipitridae	<i>Milvus migrans</i>	Black Kite	L C	PM
11	Accipitriformes	Accipitridae	<i>Buteo refectus</i>	Himalayan Buzzard	L C	PM
12	Accipitriformes	Accipitridae	<i>Buteo rufinus</i>	Long-legged Buzzard	L C	PM

Table 2. Order Anseriformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Anseriformes	Anatidae	<i>Anser anser</i>	Greylag Goose	LC	PM
2	Anseriformes	Anatidae	<i>Anser indicus</i>	Bar-headed Goose	LC	PM
3	Anseriformes	Anatidae	<i>Tadorna ferruginea</i>	Ruddy Shelduck	LC	PM
4	Anseriformes	Anatidae	<i>Tadorna tadorna</i>	Common Shelduck	LC	PM
5	Anseriformes	Anatidae	<i>Anas strepera</i>	Gadwall	LC	PM
6	Anseriformes	Anatidae	<i>Anas penelope</i>	Eurasian Wigeon	LC	PM
7	Anseriformes	Anatidae	<i>Anas platyrhynchos</i>	Mallard	LC	PM
8	Anseriformes	Anatidae	<i>Spatula clypeata</i>	Northern Shoveler	C	PM
9	Anseriformes	Anatidae	<i>Anas acuta</i>	Northern Pintail	C	PM
10	Anseriformes	Anatidae	<i>Anas querquedula</i>	Garganey	C	PM
11	Anseriformes	Anatidae	<i>Anas crecca</i>	Common Teal	C	PM
12	Anseriformes	Anatidae	<i>Netta rufina</i>	Red-crested Pochard	LC	PM
13	Anseriformes	Anatidae	<i>Aythya ferina</i>	Common Pochard	Sc	PM
14	Anseriformes	Anatidae	<i>Aythya nyroca</i>	Ferruginous Pochard	Sc	PM
15	Anseriformes	Anatidae	<i>Aythya fuligula</i>	Tufted Duck	C	PM
16	Anseriformes	Anatidae	<i>Mergus merganser</i>	Common Merganser	LC	PM

Table 3. Order Bucerotiformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Bucerotiformes	Upupidae	<i>Upupa epops</i>	Eurasian Hoopoe	C	SBV/ PM

Table 4. Order Caprimulgiformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Caprimulgiformes	Apodidae	<i>Apus apus</i>	Common Swift	C	SBV/ PM

Mountain ranges are home to a wide variety of bird species, although detailed scientific published information is not readily available. According to unpublished web information 25 migratory bird species, 100 local resident species, 120 passage migrants, and 25 winter visitors were identified (Shah, 2023). The objective of this study is to determine the population and seasonal status of migratory birds of Borith Lake and surrounding areas of district Hunza, Gilgit Baltistan, Pakistan.

MATERIALS AND METHODS

This study was carried out during August 2021 to March 2022, and field surveys were conducted in the spring from

mid-February to mid-March and in the summer from mid-August to mid-September.

Survey Methods

For birds survey two types of transect methods were used, line transect and point transect. Both methods are based on recording birds along a predefined route within a predefined survey unit. In the case of the transects, bird recording occurs continually, whereas for point counts, it occurs at regular intervals along the route and for a given duration at each point. Generally, Line and point transects are the preferred biological survey methods in many situations. These are highly adaptable methods and can be used in terrestrial and freshwater ecosystem.

Table 5. Order Charadriiformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Charadriiformes	Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt	L C	PM
2	Charadriiformes	Charadriidae	<i>Vanellus vanellus</i>	Northern Lapwing	L C	PM
3	Charadriiformes	Charadriidae	<i>Charadrius mongolus</i>	Lesser Sand-Plover	L C	PM
4	Charadriiformes	Charadriidae	<i>Charadrius alexandrinus</i>	Kentish Plover	L C	PM
5	Charadriiformes	Charadriidae	<i>Charadrius dubius</i>	Little Ringed Plover	C	PM
6	Charadriiformes	Scolopacidae	<i>Numenius arquata</i>	Eurasian Curlew	Sc	PM
7	Charadriiformes	Scolopacidae	<i>Limosa limosa</i>	Black-tailed Godwit	Ra	PM
8	Charadriiformes	Scolopacidae	<i>Philomachus pugnax</i>	Ruff SandPiper	L C	PM
9	Charadriiformes	Scolopacidae	<i>Calidris ferruginea</i>	Curlew Sandpiper	L C	PM
10	Charadriiformes	Scolopacidae	<i>Calidris temminckii</i>	Temminck's Stint	C	PM
11	Charadriiformes	Scolopacidae	<i>Calidris alpina</i>	Dunlin	L C	PM
12	Charadriiformes	Scolopacidae	<i>Calidris minuta</i>	Little Stint	C	PM
13	Charadriiformes	Scolopacidae	<i>Gallinago gallinago</i>	Common Snipe	C	PM
14	Charadriiformes	Scolopacidae	<i>Gallinago stenura</i>	Pin-tailed Snipe	Ra	PM
15	Charadriiformes	Scolopacidae	<i>Scolopax rusticola</i>	Eurasian Woodcock	L C	PM
16	Charadriiformes	Scolopacidae	<i>Xenus cinereus</i>	Terek Sandpiper	Sc	PM
17	Charadriiformes	Scolopacidae	<i>Phalaropus lobatus</i>	Red-necked Phalarope	L C	PM
18	Charadriiformes	Scolopacidae	<i>Actitis hypoleucos</i>	Common Sandpiper	C	PM
19	Charadriiformes	Scolopacidae	<i>Tringa ochropus</i>	Green Sandpiper	C	PM
20	Charadriiformes	Scolopacidae	<i>Tringa nebularia</i>	Common Greenshank	C	PM
21	Charadriiformes	Scolopacidae	<i>Tringa stagnatilis</i>	Marsh Sandpiper	Sc	SBV/ PM
22	Charadriiformes	Scolopacidae	<i>Tringa glareola</i>	Wood Sandpiper	C	PM
23	Charadriiformes	Scolopacidae	<i>Tringa totanus</i>	Common Redshank	C	PM
24	Charadriiformes	Laridae	<i>Rissa tridactyla</i>	Black-legged Kittiwake	C	PM/ WV
25	Charadriiformes	Laridae	<i>Larus ridibundus</i>	Black-headed Gull	C	PM
26	Charadriiformes	Laridae	<i>Larus brunnicephalus</i>	Brown-headed Gull	C	PM
27	Charadriiformes	Laridae	<i>Larus ichthyetus</i>	Pallas's Gull	C	PM
28	Charadriiformes	Laridae	<i>Larus cachinnans</i>	Caspian Gull	L C	PM
29	Charadriiformes	Laridae	<i>Larus fuscus</i>	Lesser Black-backed Gull	L C	PM
30	Charadriiformes	Laridae	<i>Gelochelidon nilotica</i>	Gull-billed Tern	C	PM
31	Charadriiformes	Laridae	<i>Chlidonias leucopterus</i>	White-winged Tern	Ra	PM
32	Charadriiformes	Laridae	<i>Chlidonias hybridus</i>	Whiskered Tern	L C	PM

Table 6. Order Ciconiiformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Ciconiiformes	Ciconiidae	<i>Ciconia nigra</i>	Black Stork	C	PM

Table 7. Order Columbiformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Columbiformes	Columbidae	<i>Columba eversmanni</i>	Yellow-eyed/Pale-backed Pigeon	Ra	PM
2	Columbiformes	Columbidae	<i>Streptopelia decaocto</i>	Eurasian Collared-Dove	Sc	SBV/ PM

Table 8. Order Coraciiformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Coraciiformes	Meropidae	<i>Merops persicus</i>	Blue-cheeked Bee-eater	L C	PM
2	Coraciiformes	Coraciidae	<i>Coracias garrulus</i>	European Roller	C	SBV/ PM

Table 9. Order Cuculiformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Cuculiformes	Cuculidae	<i>Hierococcyx varius</i>	Common Cuckoo	C	SBV/ PM

Table 10. Order Falconiformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Falconiformes	Falconidae	<i>Falco subbuteo</i>	Eurasian Hobby	C	SBV/ PM
2	Falconiformes	Falconidae	<i>Falco peregrinoides</i>	Barbary Falcon	C	SBV/ PM
3	Falconiformes	Falconidae	<i>Falco peregrinus</i>	Peregrine Falcon	L C	PM

Table 11. Order Galliformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Galliformes	Phasianidae	<i>Coturnix coturnix</i>	Common Quail	C	PM

Table 12. Order Gruiformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Gruiformes	Rallidae	<i>Rallus aquaticus</i>	Water Rail	L C	PM/ WV
2	Gruiformes	Rallidae	<i>Porzana porzana</i>	Spotted Crane	L C	PM/ WV
3	Gruiformes	Rallidae	<i>Gallinula chloropus</i>	Common/Eurasian Moorhen	C	PM

These can be used to survey individual species, or groups of species. Both can be used to examine bird- habitat relationships, and both can be used to derive relative and absolute measures of bird abundance (Khan *et al.*, 2010a,b).

Line Transect

This technique involves traveling a predetermined route and recording birds on either side of the observer (Khan *et al.*, 2010).

Point Transect

This method is differ from the line transect in that the observers travel along the transect and stop at predefined point, allow the birds time to settle, and then records all the birds seen or heard for a predefined time, ranging, at the extremes, from 2 to 20 minutes (Khan *et al.*, 2010).

Birds Counting

For birds counting study areas visited three times from 5.00 to 7.30 am, 10.30 am to 12.0 hours and finally 4.30 to 6.00 pm. We used Burnham *et al.* (1980) technique: Birds were counted using 20-minute line transect count [Three observations/ hour×3 hour per day ×4 days/ month with the settlement period of six minutes between two observation sessions] in which we pass over a line and recorded birds as the target objects method.

Powerful binoculars and telescopes have been used for spotting the birds quite far away or high up in the sky. Identification of birds was made from calls and sight records. During the filed surveys secondary data had been collected from local people, internet and published materials. The bird identification was carried out with the help of field guides and avian fauna books including Ali and Ripley (1987), Robert (1991, 1992), Grimmette *et al.* (1998) and Grimmett *et al.* (2008).

RESULTS

Every year naturally several birds species show long distance and short distance migration in search of good habitat and food or to sometime avoid cold weather conditions. During winter season large number of birds migrate from central Asia and Europe to Pakistan via International Migratory Bird Route Number 4 from Karakoram down to Indus delta province of Sindh (Umar *et al.*, 2018).

At 36 25' 52" N, 74 51' 40" E, Borith Lake is situated in the District of Hunza. The Lake is only saltwater lake in Hunza. It is a spectacular lake situated between the Glaciers of Passu Gar and Ghulkin. Borith Lake is inhabited to a variety of eco zones, including a saltwater lake, reed beds, small plantations, pastures, and communities, as well as sea buck thrones with grassy scrub, scant flora, and barren rocky slopes bordered by glaciers and scree and the Rocky Mountains.

In Pakistan there are 660 birds species (Roberts, 1991), another study Grimmett *et al.* (2008) recorded 670 species.

In an earlier study Robert (1991) reported that there are 230 species of birds observed in Gilgit Baltistan and surroundings areas.

In the present study, a total 161 migratory species belonging to 18 orders and 39 families were recorded during the years 2021 – 2022 (Tables 1-18). Out of these 78 (48%) species are passage migrants, 21 (13%) winter visitors / passage migrants, 50 (31%) summer breeding visitors/ passage migrants, and 12 (8%) species are winter visitors (Table 19, Fig. 1).

Table 13. Order Passeriformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Passeriformes	Laniidae	<i>Lanius collurio</i>	Red-backed Shrike	L C	SBV/ PM
2	Passeriformes	Laniidae	<i>Lanius phoenicuroides</i>	Red-tailed Shrike	L C	SBV/ PM
3	Passeriformes	Laniidae	<i>Lanius isabellinus</i>	Isabelline/Rufous-tailed Shrike	L C	SBV/ PM
4	Passeriformes	Laniidae	<i>Lanius schach</i>	Long-tailed Shrike	L C	SBV/ PM
5	Passeriformes	Laniidae	<i>Lanius excubitor</i>	Steppe Grey Shrike	L C	SBV/ PM
6	Passeriformes	Oriolidae	<i>Oriolus oriolus</i>	Indian Golden Oriole	C	SBV/ PM
7	Passeriformes	Corvidae	<i>Corvus corone</i>	Carrion Crow	C	WV/ r
8	Passeriformes	Corvidae	<i>Corvus corax</i>	Common Raven	L C	WV/ r
9	Passeriformes	Alaudidae	<i>Calandrella brachydactyla</i>	Greater Short-toed Lark	L C	SBV/ PM
10	Passeriformes	Alaudidae	<i>Alauda lacheleensis</i>	Asian Short-toed Lark	L C	SBV/ PM
11	Passeriformes	Alaudidae	<i>Alauda arvensis</i>	Eurasian Skylark	L C	SBV/ PM
12	Passeriformes	Alaudidae	<i>Alauda gulgula</i>	Oriental Skylark	L C	SBV/ PM
13	Passeriformes	Hirundinidae	<i>Hirundo rupestris</i>	Eurasian Crag-Martin	C	SBV/ PM
14	Passeriformes	Hirundinidae	<i>Hirundo rustica</i>	Barn Swallow	C	SBV/ PM
15	Passeriformes	Hirundinidae	<i>Delichon dasypus</i>	Asian House-Martin	L C	SBV/ PM
16	Passeriformes	Phylloscopidae	<i>Phylloscopus collybita</i>	Common/Siberian Chiffchaff	L C	SBV/ PM
17	Passeriformes	Phylloscopidae	<i>Phylloscopus sindianus</i>	Mountain Chiffchaff	L C	SBV/ PM
18	Passeriformes	Phylloscopidae	<i>Phylloscopus griseolus</i>	Sulphur-bellied Warbler	L C	SBV/ PM
19	Passeriformes	Phylloscopidae	<i>Phylloscopus humei</i>	Hume's Warbler	L C	SBV/ PM
20	Passeriformes	Phylloscopidae	<i>Phylloscopus trochiloides</i>	Greenish Warbler	C	SBV/ PM
21	Passeriformes	Acrocephalidae	<i>Hippolais caligata</i>	Booted Warbler	L C	SBV/ PM
22	Passeriformes	Acrocephalidae	<i>Iduna rama</i>	Sykes's Warbler	L C	SBV/ PM
23	Passeriformes	Acrocephalidae	<i>Acrocephalus agricola</i>	Paddyfield Warbler	L C	SBV/ PM
24	Passeriformes	Acrocephalidae	<i>Acrocephalus dumetorum</i>	Blyth's Reed-Warbler	L C	SBV/ PM
25	Passeriformes	Locustellidae	<i>Locustella naevia</i>	Common Grasshopper-Warbler	L C	SBV/ PM
26	Passeriformes	Sylviidae	<i>Sylvia nana</i>	Asian Desert Warbler	Ra	PM
27	Passeriformes	Sylviidae	<i>Sylvia nisoria</i>	Barred Warbler	Ra	PM
28	Passeriformes	Sylviidae	<i>Sylvia althaea</i>	Hume's Whitethroat	L C	SBV/ PM
29	Passeriformes	Sylviidae	<i>Sylvia curruca</i>	Lesser Whitethroat	L C	SBV/ PM
30	Passeriformes	Sylviidae	<i>Sylvia communis</i>	Greater/Common Whitethroat	L C	PM/ WV
31	Passeriformes	Muscicapidae	<i>Muscicapa striata</i>	Spotted Flycatcher	L C	PM/ WV
32	Passeriformes	Muscicapidae	<i>Luscinia svecica</i>	Bluethroat	L C	PM/ WV
33	Passeriformes	Muscicapidae	<i>Luscinia pectoralis</i>	White-tailed Rubythroat	L C	SBV/ PM
34	Passeriformes	Muscicapidae	<i>Ficedula parva</i>	Red-breasted Flycatcher	L C	PM/ WV
35	Passeriformes	Muscicapidae	<i>Phoenicurus frontalis</i>	Blue-fronted Redstart	L C	SBV/ PM
36	Passeriformes	Muscicapidae	<i>Phoenicurus erythronotus</i>	Rufous-backed Redstart	L C	WV/ r
37	Passeriformes	Muscicapidae	<i>Phoenicurus coeruleocephala</i>	Blue-capped Redstart	L C	SBV/ PM
38	Passeriformes	Muscicapidae	<i>Phoenicurus ochruros</i>	Black Redstart	L C	SBV/ PM
39	Passeriformes	Muscicapidae	<i>Phoenicurus phoenicurus</i>	Common Redstart	L C	SBV/ PM
40	Passeriformes	Muscicapidae	<i>Monticola saxatilis</i>	Rufous-tailed Rock-Thrush	L C	PM/ WV
41	Passeriformes	Muscicapidae	<i>Monticola solitarius</i>	Blue Rock-Thrush	C	SBV/ PM
42	Passeriformes	Muscicapidae	<i>Saxicola maurus</i>	Siberian Stonechat	L C	SBV/ PM
43	Passeriformes	Muscicapidae	<i>Oenanthe oenanthe</i>	Northern Wheatear	L C	PM/ WV
44	Passeriformes	Muscicapidae	<i>Oenanthe pleschanka</i>	Pied Wheatear	L C	SBV/ PM
45	Passeriformes	Muscicapidae	<i>Oenanthe isabellina</i>	Isabelline Wheatear	L C	PM/ WV
46	Passeriformes	Turdidae	<i>Turdus atrogularis</i>	Dark/Black-throated Thrush	C	WV/ r
47	Passeriformes	Sturnidae	<i>Sturnus vulgaris</i>	Common/European Starling	L C	WV/ r
48	Passeriformes	Sturnidae	<i>Pastor roseus</i>	Rosy Starling	Ra	PM/ WV
49	Passeriformes	Prunellidae	<i>Prunella atrogularis</i>	Black-throated Accentor	L C	WV/ r
50	Passeriformes	Motacillidae	<i>Motacilla flava</i>	Western Yellow Wagtail	L C	SBV/ PM
51	Passeriformes	Motacillidae	<i>Motacilla citreola</i>	Citrine Wagtail	L C	SBV/ PM
52	Passeriformes	Motacillidae	<i>Anthus campestris</i>	Tawny Pipit	L C	PM/ WV
53	Passeriformes	Motacillidae	<i>Anthus trivialis</i>	Tree Pipit	L C	PM/ WV
54	Passeriformes	Motacillidae	<i>Anthus cervinus</i>	Red-throated Pipit	L C	PM/ WV
55	Passeriformes	Motacillidae	<i>Anthus spinoletta</i>	Water Pipit	L C	WV/ r
56	Passeriformes	Motacillidae	<i>Anthus rubescens</i>	Buff-bellied Pipit	L C	PM/ WV
57	Passeriformes	Emberizidae	<i>Emberiza leucocephalos</i>	Pine Bunting	Ra	PM/ WV
58	Passeriformes	Emberizidae	<i>Emberiza buchanani</i>	Grey-hooded Bunting	L C	PM/ WV
59	Passeriformes	Emberizidae	<i>Emberiza hortulana</i>	Ortolan Bunting	C	PM/ WV
60	Passeriformes	Emberizidae	<i>Emberiza citrinella</i>	Yellowhammer	Ra	PM
61	Passeriformes	Emberizidae	<i>Emberiza stewarti</i>	White capped/Chestnut-breasted Bunting	C	SBV/ PM
62	Passeriformes	Emberizidae	<i>Emberiza pusilla</i>	Little Bunting	C	PM
63	Passeriformes	Emberizidae	<i>Emberiza rutila</i>	Chestnut Bunting	Sc	PM/ WV
64	Passeriformes	Emberizidae	<i>Emberiza melanocephala</i>	Black-headed Bunting	Sc	PM
65	Passeriformes	Emberizidae	<i>Emberiza bruniceps</i>	Red-headed Bunting	L C	PM
66	Passeriformes	Emberizidae	<i>Emberiza schoeniclus</i>	Reed Bunting	L C	PM
67	Passeriformes	Fringillidae	<i>Phylloscopus collybita</i>	Common Chaffinch	L C	WV/ r
68	Passeriformes	Fringillidae	<i>Fringilla montifringilla</i>	Brambling	L C	WV/ r
69	Passeriformes	Fringillidae	<i>Carpodacus erythrinus</i>	Common Rosefinch	L C	SBV/ PM
70	Passeriformes	Fringillidae	<i>Carpodacus puniceus</i>	Red-fronted Rosefinch	L C	PM
71	Passeriformes	Fringillidae	<i>Spinus spinus</i>	Eurasian Siskin	L C	WV/ r
72	Passeriformes	Passeridae	<i>Passer domesticus</i>	House Sparrow	C	SBV/ PM
73	Passeriformes	Passeridae	<i>Passer hispaniolensis</i>	Spanish Sparrow	C	WV/ r
74	Passeriformes	Passeridae	<i>Petronia petronia</i>	Rock Petronia	L C	WV/ r

Table 14. Order Pelecaniformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Pelecaniformes	Ardeidae	<i>Botaurus stellaris</i>	Great Bittern	L C	PM
2	Pelecaniformes	Ardeidae	<i>Ixobrychus minutus</i>	Little Bittern	L C	PM
3	Pelecaniformes	Ardeidae	<i>Ardea cinerea</i>	Grey Heron	C	PM
4	Pelecaniformes	Ardeidae	<i>Ardea alba</i>	Great Egret	L C	PM
5	Pelecaniformes	Ardeidae	<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	L C	SBV/ PM
6	Pelecaniformes	Threskiornithidae	<i>Plegadis falcinellus</i>	Glossy Ibis	L C	PM

Table 15. Order Piciformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Piciformes	Picidae	<i>Jynx torquilla</i>	Eurasian Wryneck	C	SBV/ PM

Table 16. Order Podicipediformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Podicipediformes	Podicipedidae	<i>Podiceps auritus</i>	Horned Grebe	Ra	PM/ WV
2	Podicipediformes	Podicipedidae	<i>Podiceps cristatus</i>	Great Crested Grebe	L C	PM
3	Podicipediformes	Podicipedidae	<i>Podiceps nigricollis</i>	Black-necked/Eared Grebe	L C	PM

Table 17. Order Strigiformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Strigiformes	Strigidae	<i>Asio flammeus</i>	Short-eared Owl	Ra	PM

Table 18. Order Suliformes: Population and Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

S. No.	Order	Family	Scientific name	Common name	Population status	Seasonal status
1	Suliformes	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	Great Cormorant	C	PM

While, population viz 47 (29%) species observed as common, 92 (57%) less common, 9 (6%) scarce and 13 (8%) species were listed as rare (Table 20, Fig. 2). In the Spring from mid-February to mid-March and in the Summer from mid-August to mid-September large number of migratory avian species were observed at the lake and surrounding areas. The population and distribution of birds in a particular area depends on several factors which include quality and availability of food, perching, roosting, and suitable nesting area. But quantity of food and shelter are most important.

Table 19. Seasonal status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

Seasonal Status	Quantity	Percentage
PM	78	48%
PM/ WV	21	13%
SBV/ PM	50	31%
WV/ r	12	8%
Total	161	100%

PM – Passage Migrant, PM/WV – Passage Migrant/ Winter Visitor, SBV/PM – Summer Breeder Visitor/ Passage Migrant, WV/ r - Winter Visitor/ Resident

Table 20. Population status of Birds recorded in Borith Lake and surrounding areas during 2021-2022.

Population status	Quantity	Percentage
Common	47	29%
Rare	13	8%
Less Common	92	57%
Scarce	9	6%
Total	161	100%

Ra – Rare: 1 – 4, S – Scarce: 5 – 9, LC - Less Common: 10 – 14, C – Common: 15 above

Wetland is one of the three major ecosystems in the world, and wetlands of Gilgit Baltistan are favorable winter/ summer and breeding sites for migratory birds. Borith Lake and surrounding areas are providing good habitat to residents and supports large number of migratory birds. Among observed migratory species at study areas, order Passeriformes is a dominated order and consisting of 74 species, while order Charadriiformes 32 species, Anseriformes 16, Accipitriformes 12, Pelecaniformes 6, Falconiformes 3, Gruiformes 3, Podicipediformes 3, Columbiformes 2, Coraciiformes 2, Bucerotiformes 01, Caprimulgiformes 01, Ciconiiformes 01, Cuculiformes 01, Galliformes 01, Piciformes 01, Strigiformes 01 and order

Suliformes has 01 species. During the study we have not seen any major threat to lake and surrounding areas. Due to rich bio-ecology and presence of resident and migratory birds this lake is a good site for ecotourism (See some selected migratory birds recorded during 2021 – 2022 at Borith Lake and surrounding areas Figs. 3 – 37).

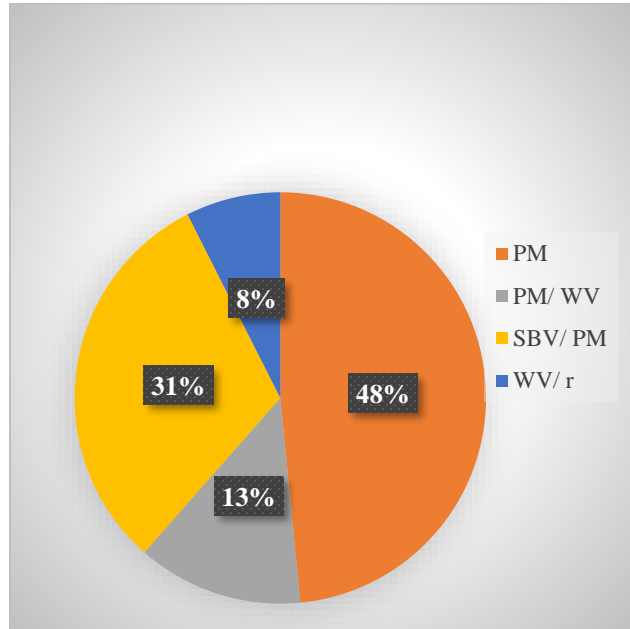


Fig. 1. Seasonal status of birds of Borith Lake and surrounding areas.

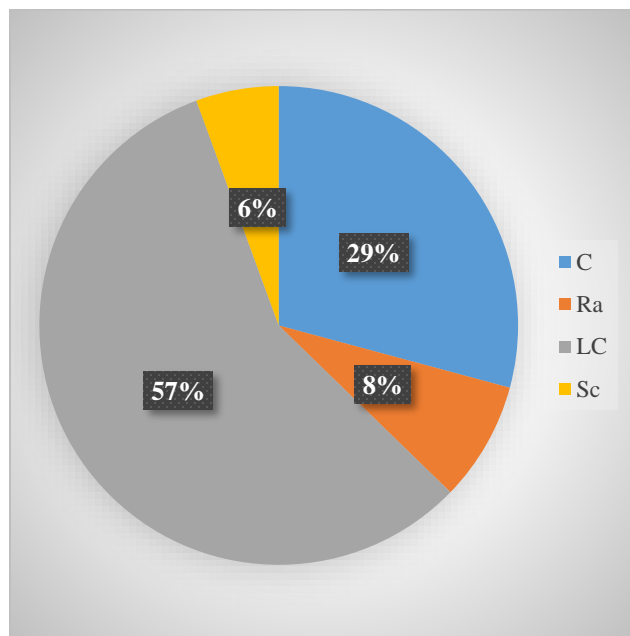


Fig. 2. Population status of birds of Borith Lake and surrounding areas.

Some selected migratory birds of Borith Lake and surrounding areas.

Order Acciptriformes



Fig. 3. Long legged Buzzard (*Buteo rufinus*).



Fig. 4. Steppe Eagle (*Aquila nipalensis*).

Order Anseriformes



Fig. 5. Grey Lag Goose (*Anser anser*).



Fig. 6. Gadwall (*Anas strepera*).

Order Bucerotiformes



Fig. 7. Hoopoe (*Upapa epops*).

Caprimulgiformes



Fig. 8. Common Swift (*Apus apus*).

Order Charadriiformes



Fig. 9. Black-winged Stilt (*Himantopus himantopus*).



Fig. 10. Curlew Sandpiper (*Calidris ferruginea*).

Ciconiiformes



Fig. 11. Black Stork (*Ciconia nigra*).

Order Columbiformes



Fig. 12. Eurasian Collared-Dove (*Streptopelia decaocto*).

Order Cuculiformes



Fig. 15. Common Cuckoo (*Hierococcyx varius*).

Order Coraciiformes



Fig. 13. Blue-cheeked Bee-eater (*Merops persicus*).

Order Falconiformes



Fig. 16. Barbary Falcon (*Falco pelegrinoides*).



Fig. 14. European Roller (*Coracias garrulous*).



Fig. 17. Eurasian Hobby (*Falco subbuteo*).

Order Galliformes

Fig. 18. Common Quail (*Coturnix coturnix*).

Order Gruiformes

Fig. 19. Water Rail (*Rallus aquaticus*).



Fig. 20. Spotted Crake (*Porzana porzana*).

Order Passeriformes

Fig. 21. White-tailed Ruby throat (*Luscinia pectoralis*).



Fig. 22. Mountain chiffchaff (*Phylloscopus sindianus*).

Order Pelecaniformes

Fig. 23. Little Bittern (*Ixobrychus minutus*).



Fig. 24. Great Egret (*Ardea alba*).



Fig. 27. Great Crested Grebe (*Podiceps cristatus*).

Order Piciformes



Fig. 25. Eurasian Wryneck (*Jynx torquilla*).

Order Strigiformes



Fig. 28. Short-eared Owl (*Asio flammeus*).

Order Podicipediformes



Fig. 26. Horned Grebe (*Podiceps auritus*).

Order Suliformes



Fig. 29. Great Cormorant (*Phalacrocorax carbo*).

CONCLUSION

This study concluded that Gilgit Baltistan encompasses a wide range of natural wetland habitats, including peatlands, lakes, marshy regions, streams, and rivers. Borith Lake has 161 migratory species and good habitat for resident and migratory species. In the Spring from mid-February to mid-March and in the Summer from mid-August to mid-September large numbers of migratory avifauna were observed at the lake and surrounding areas.

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